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Reflecting on the pedagogic benefits of an assessed class-room based professional complex emergency simulation: Responding to fire and other hazards in an industrial urban setting under (time / assessment) pressure

Simon Griffiths and **Richard Kotter**
Department of Geography and Environmental Sciences

Northumbria University, Newcastle upon Tyne, UK

MSc Disaster Management and Sustainable Development
Integrated Emergency Management module

Module Learning Outcomes (MLOs) – which feed into/cover partially the Programme Learning Outcomes (PLOs)

Knowledge & Understanding:

- MLO1: Evaluate the effectiveness of approaches to integrated emergency management
- MLO2: Employ structured risk based methodologies to define the potential impacts from emergencies.

Intellectual / Professional skills & abilities:

- MLO3: Identify and evaluate limitations in delivering resilience despite integrated management approaches being applied
- MLO4: Critically review the methods for resilience building through anticipation and planning based on local, national and/or international drivers.

Personal Values Attributes (Global / Cultural awareness, Ethics, Curiosity) (PVA):

- MLO5: Evaluate how integrated emergency management is applied to all populations in an equitable manner in accordance with human rights.

(see also Phelps (2010); Phillips et al. (2012); Haddow et al. (2014); McCreight (2017))

Formative (assessment) task

- **Purpose:**
  - to have groups plan a response to an incident in the classroom
  - present to the whole class with justification for what they think is important, etc.
- **Context:**
  - early phase of the response with limited information available
- **Outturn:**
  - Student frustration at not being able to answer the question just like the initial phase of an incident, planned for, or not…
  - Underpins the Integrated Emergency Management process

Purpose of summative assessment

- Application of knowledge in a non-linear fashion to respond to an **authentic** setting for major incident response management

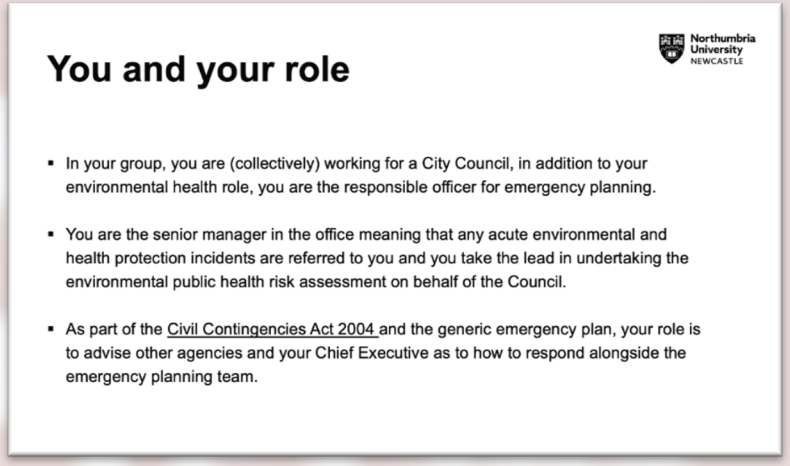
- **Authentic learning**
  - *'Authentic learning typically focuses on **real-world**, **complex** problems and their **solutions**, using **role-playing exercises**, **problem-based activities**, case studies, and participation in virtual communities of practice'* (Lombardi, 2007)

Contextualised with images from live play exercises, videos from real incidents, etc. we've been involved in

The summative assessment

- Responding to an unseen desktop exercise
  - Big Bang event
  - By several IEM teams (groups) – Fire & Rescue Service, City Council, private company [could be any organisation that is not the specialist public sector or local authority]

- More concerned with demonstrating thought processes in responding to an incident
  - Adaptability tested.
  - Group (and inter-group) working dynamics.
  - Time pressures (becoming more severe along the evolving incident).



The summative assessment

- Desktop exercise:
  - Builds with inputs at **undisclosed time intervals.**
  - Unknowns, just like a real response.
  - Uncontrolled open fire – public health threat from products of combustion, potential spread, disruption to infrastructure, etc.
  - Complicated by asbestos loss from structure and spillages of chemicals during evacuation, food model affected

- We are primarily assessing **thought processes in application** over recall
  - Adaptability.
  - Group working (including inter-group) dynamics.
  - Time pressures (becoming more severe along as the incident as evolving).

Inject 1: A "Big Bang" incident

It's 1341 on a sunny Tuesday in late July, a fire is reported by members of the public. They call 999 and ask for the Fire Service.

The location is given as a factory on the Byker Industrial Estate of Newcastle upon Tyne.

The cascade between the emergency services triggers a notification to the Council's Civil Contingencies team and is passed to you to assist in the response. It is now 14:10.

You are told that (a) a fire has been reported at Disk4U, a CD/DVD manufacturer, (b) fire and ambulance services are in attendance, (c) no casualties are currently reported.

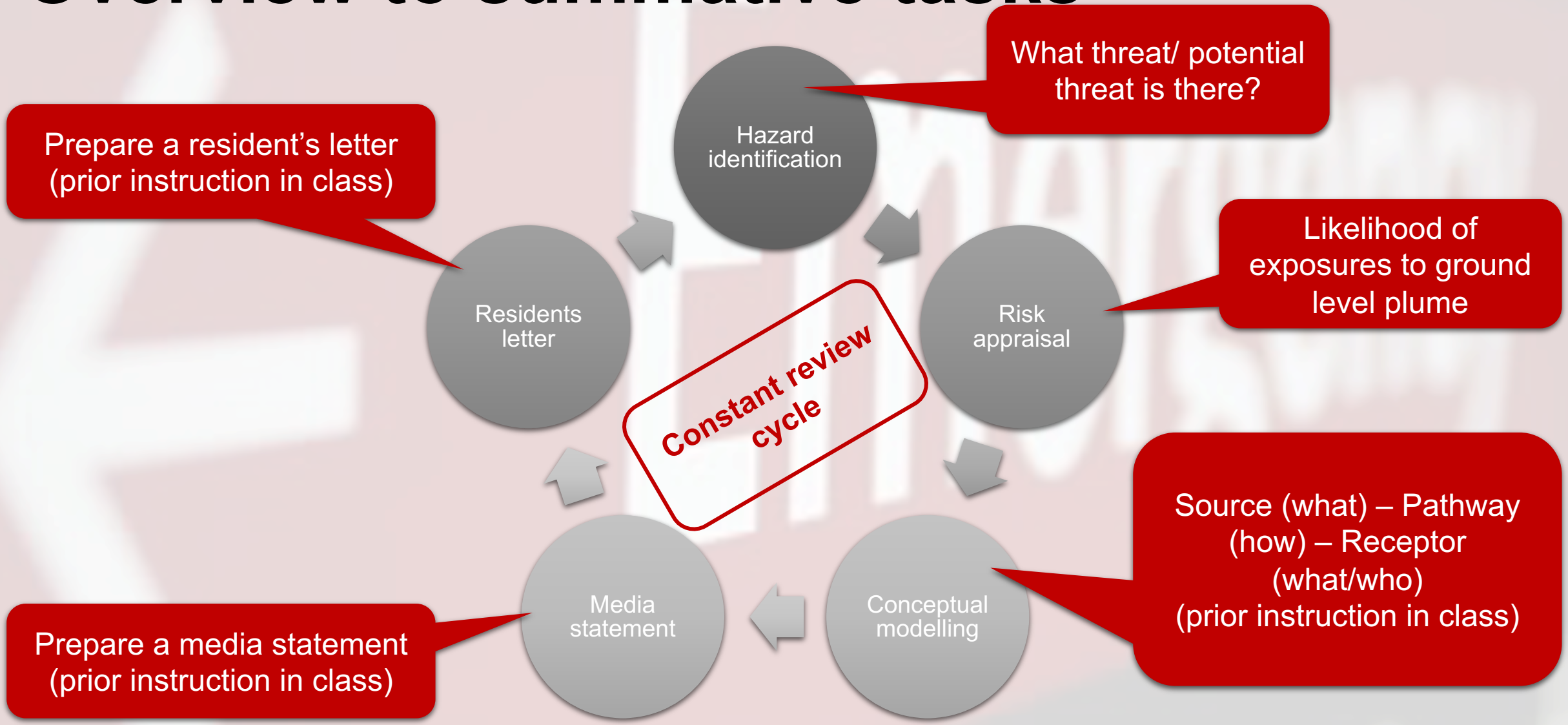
Inject 2a: Incident developing: @1432

The fire service have declared this a major incident and have 5 pumps ('fire engines') on the scene.

A large plume has been produced which is visible across the east of the city. It is heading across a light rail line and then out beyond the city itself towards cultivated farm land.

The Police have called a tactical (or 'silver meeting') to be held at Police HQ.

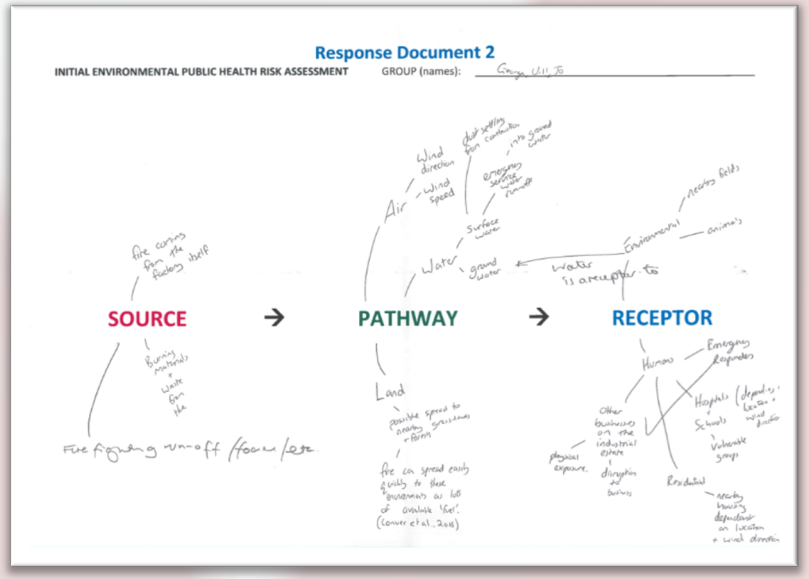
Overview to summative tasks

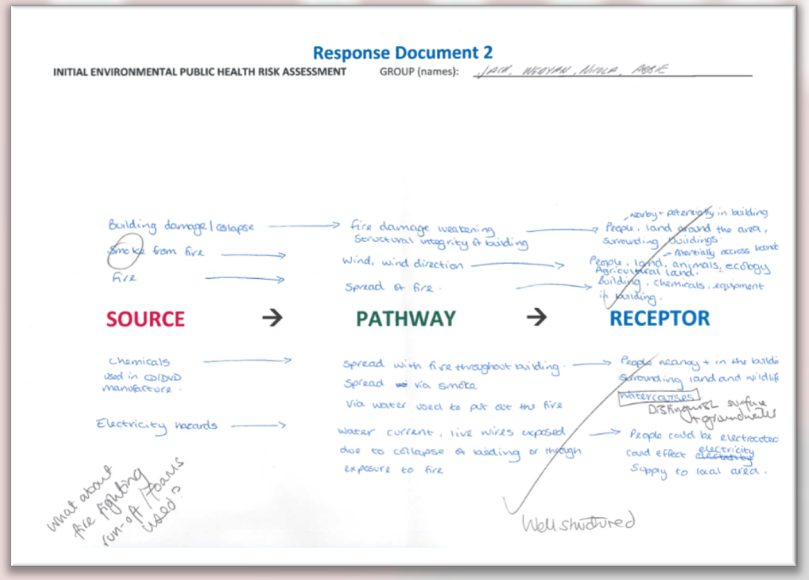


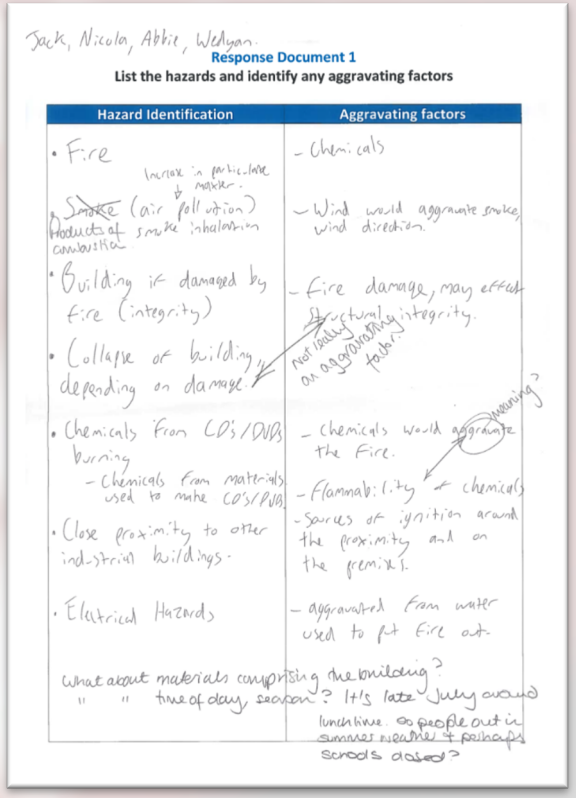
What's the hazard? What are (current) aggravating factors?

- Alongside injects, specific tasks are required
  - E.g.
    - **Hazard identification** + **factors thought to aggravate situation**
    - Application of a **pathway conceptual model***

Continuous feedback loop: Have your decisions changed with each new inject? Should they? Students / Teams challenged to review each time.







*Described originally by Holdgate (1979) but adaptable to a range of uses, e.g. Narayan, et al (2012), Davies, (2017) and Waldschläger, et al (2020)

Risk assessment and scaling the event

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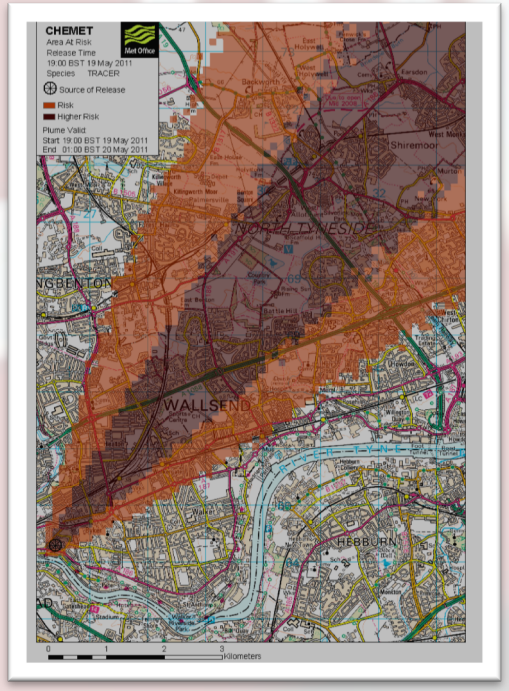
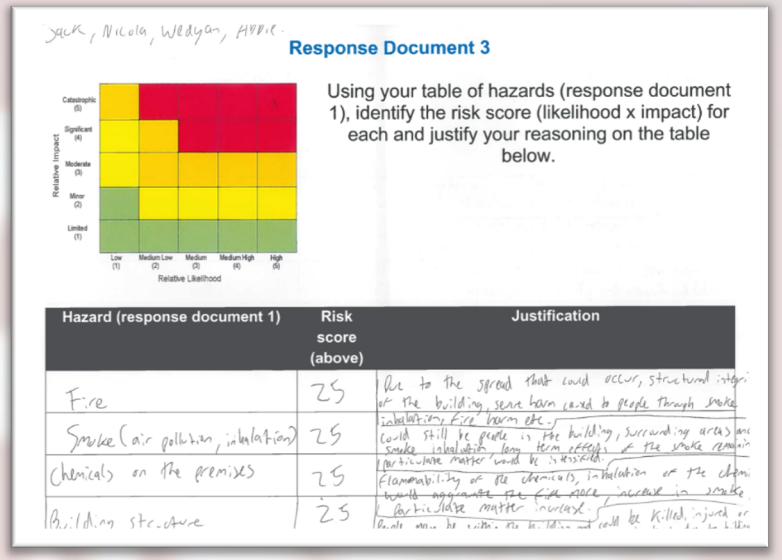
- Defining the student's perception of risk:
  - Key is *justification*
  - *Why* is the group thinking the way it is?
  - *Is* the risk score justifiable?

- Includes real world materials
  - CHEMETs
  - Material Safety Data Sheets (MSDS) for specific chemicals



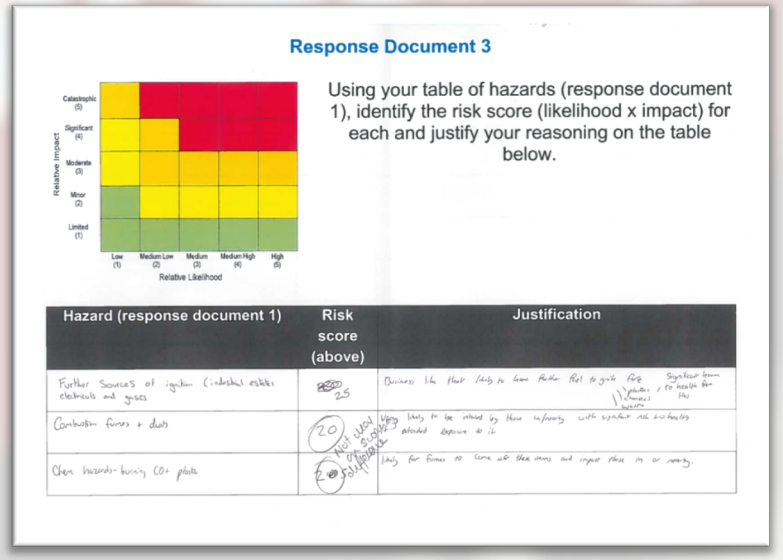


Response Document 3

Using your table of hazards (response document 1), identify the risk score (likelihood x impact) for each and justify your reasoning on the table below.

Relative Impact: Catastrophic (5), Significant (4), Moderate (3), Minor (2), Limited (1)
Relative Likelihood: Low (1), Medium Low (2), Medium (3), Medium High (4), High (5)

Hazard (response document 1)	Risk score (above)	Justification
Fire	25	Due to the spread that could occur, structural integri of the building serve harm caused to people through smoke inhalation, fire burns etc.
Smoke (air pollution, inhalation)	25	Could still be people in the building, surrounding areas and smoke inhalation long term effects of the smoke remain particulate matter would be irritated
Chemicals on the premises	25	Flammability of the chemicals, inhalation of the chemi would aggravate the fire more, increase in smoke
Building structure	25	Particulate matter increase, could be killed, injured or



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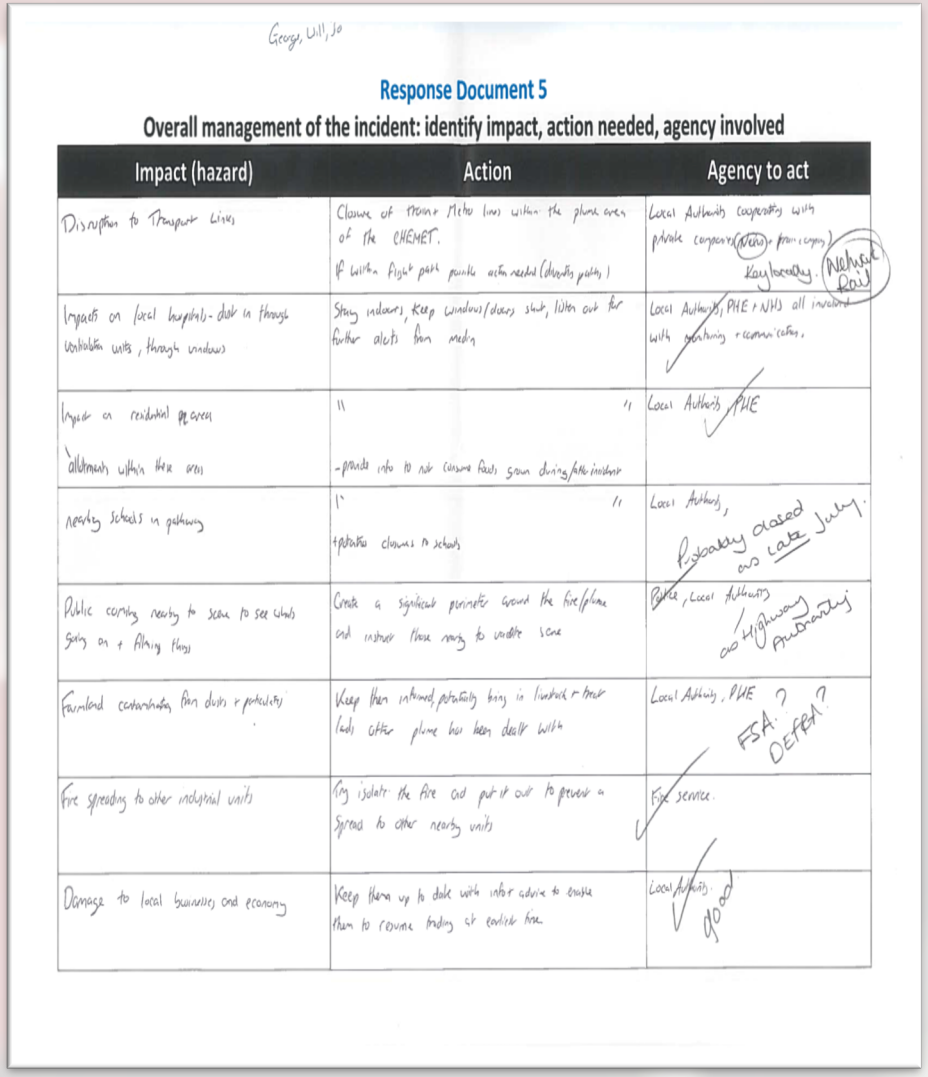
Hazard (response document 1)	Risk score (above)	Justification
Further Sources of ignition (i.e. batteries, electricals and gases	25	Business like these likely to cause further fire to spread, fire Significant harm to people, fire
Combustion fumes + dusts	20	Likely to be inhaled by those unfamiliar with hazardous substances detected exposure to it
Clean hazardous-burning CO2 plants	25	Likely for fumes to come with them smoke and impact those in or nearby.

Multi-agency response: interoperability/interactivity

- Identify the synergies available to deliver a comprehensive response
  - What do the respective groups need to know (including from each other)?
  - Who (which organisation / team / source) can provide the information/response?

- Two approaches taken:
  1. Groups are assigned a specific agency with a clear agenda, and the groups interact internally and with each other across the classroom; or
  2. Groups are managing everything and identify who can help them to tackle the hazards identified and so manage the incident as it evolves.



George, Will, Jo

Response Document 5

Overall management of the incident: identify impact, action needed, agency involved

Impact (hazard)	Action	Agency to act
Disruption to Transport Links	Closure of Thames Water lines within the plume area of the CHEMET. If within flight path provide water needed (identify points)	Local Authority cooperating with private companies (Veolia - from Cogent) Key Locality. (Nathalie Rail)
Impacts on local hospitals - close in through ventilation units, through windows	Stay indoors, keep windows/doors shut, listen out for further alerts from media	Local Authority, PHE + NHS all involved with monitoring + communications.
Impact on residential properties / businesses within these areas	" " - provide info to ask concerns/fears given during/after incident	Local Authority PHE
Nearby schools in gathering	" " updates/closures to schools	Local Authority, Probably closed on Late July.
Public coming nearby to scene to see what's going on + Affecting flows	Create a significant perimeter around the fire/plume and instruct those nearby to vacate scene	Police, Local Authority on Highway Authority
Farmland contamination from dusts + particulates	Keep them informed potentially long in timescale + those lands affter plume has been dealt with	Local Authority, PHE ? FSA ? DEFRA ?
Fire spreading to other industrial units	Try isolate the fire and put it out to prevent a spread to other nearby units	Fire service.
Damage to local businesses and economy	Keep them up to date with info/advice to enable them to resume trading at earliest time.	Local Authority good

The student response to our approach

- **Prior to the exercise**
  - Not knowing much about the incident can cause a *little* worry
  - Supportive environment for students' worries

- **During the exercise**
  - Students are focussed on their tasks
  - Good group debate(s)
  - Live research is undertaken – access to IT in the room

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The student response to our approach

- **After the exercise**
  - Positive feedback
  - Enjoyed the challenge
  - Pre-exercise reservations about the assessment disappear when they get on with the response: focus
  - Recognise that they ‘survived’ through the ordeal
  - Tired from the concentration, just like an authentic response …

  - Fun?!

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Question(s)

Thank you for your attention – any questions?

Please now, or afterwards by e-mail:

simon.griffiths@northumbria.ac.uk

richard.kotter@northumbria.ac.uk

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